

We Claim:

1. A method for cooling a galley food cart on an aircraft comprising:
transferring heat from a galley food cart by a point-of-use heat exchange system to a liquid cooled condenser;
circulating liquid coolant through said liquid cooled condenser to remove heat from said liquid cooled condenser;
circulating said liquid coolant from said liquid cooled condenser in a liquid coolant loop to a heat expelling heat exchanger expelling heat to a heat sink for cooling said liquid coolant; and
circulating cooled liquid coolant in said liquid coolant loop to said liquid cooled condenser, and wherein said liquid coolant is maintained at a temperature from about 15°F to about 30°F above a temperature of said heat sink.
2. The method of claim 1, further comprising expelling said heat from said heat expelling heat exchanger to a location remote from said galley food cart.
3. The method of claim 1, wherein said step of transferring heat from said galley food cart comprises cycling a flow of cooling air from a heat exchanger cooled by said liquid cooled condenser through an air over system to provide cooling air over at least one food cart in a galley cabinet.
4. The method of claim 1, wherein said step of transferring heat from said galley food cart comprises cycling a flow of cooling air from a heat exchanger cooled by said liquid cooled condenser through an air through system to provide cooling air directly through ports in at least one said galley food cart.
5. The method of claim 1, wherein said step of transferring heat from said galley food cart comprises cycling a flow of cooling air from a thermal convection air cooling system providing at least one cooled galley food cart surface to remove heat therein.
6. The method of claim 1, wherein said circulating liquid coolant is maintained in a temperature range from about 40° F to about 160° F.
7. The method of claim 1, wherein said circulating coolant liquid is water.

8. The method of claim 1, wherein said circulating liquid coolant is a mixture of water and glycol.

9. The method of claim 1, wherein said heat expelling heat exchanger comprises a second stage refrigerant cooling system.

10. The method of claim 1, wherein heat from a plurality of galley food carts is transferred to said circulating liquid coolant.

11. A cooling system for providing cooling air to cool at least one food cart in an aircraft galley, comprising:

a point of use food cooling heat exchange system for transferring heat from a galley food cart, said food cooling heat exchange system including a liquid cooled condenser for receiving said heat;

means for circulating liquid coolant through said liquid cooled condenser to remove heat from said liquid cooled condenser;

a heat expelling heat exchanger expelling heat to a heat sink; and

means for circulating said liquid coolant from said liquid cooled condenser in a liquid coolant loop through said heat expelling heat exchanger, and wherein said liquid coolant is maintained at a temperature from about 15°F to about 30°F above a temperature of said heat sink.

12. The cooling system of claim 11, further comprising means for expelling said heat from said heat expelling heat exchanger to a location remote from said galley food cart.

13. The cooling system of claim 11, wherein said point of use food cooling heat exchange system comprises means for cycling a flow of cooling air from a heat exchanger cooled by said liquid cooled condenser through an air over system to provide cooling air over at least one food cart in a galley cabinet.

14. The cooling system of claim 11, wherein said point of use food cooling heat exchange system comprises means for cycling a flow of cooling air from a heat exchanger cooled by said liquid cooled condenser through an air through system to provide cooling air directly through ports in at least one said galley food cart.

15. The cooling system of claim 11, wherein point of use food cooling heat exchange system comprises means for cycling a flow of cooling air from a thermal convection air cooling system providing at least one cooled galley food cart surface to remove heat therein.

16. The cooling system of claim 11, wherein said circulating liquid coolant is maintained in a temperature range from about 40° F to about 160° F.

17. The cooling system of claim 11, wherein said circulating coolant liquid is water.

18. The cooling system of claim 11, wherein said circulating liquid coolant is a mixture of water and glycol.

19. The cooling system of claim 11, wherein said heat expelling heat exchanger comprises a second stage refrigerant cooling system.

20. The cooling system of claim 11, wherein heat from a plurality of galley food carts is transferred to said circulating liquid coolant.

21. A cooling system for providing cooling air to cool an aircraft galley, comprising:
a housing including an enclosure with at least one vent for receiving air from the aircraft galley;

a compressor motor mounted to the housing for compressing a refrigerant coolant;
a condenser mounted to the housing for receiving and cooling the refrigerant coolant from the compressor motor;

an expansion valve mounted to the housing receiving cooled refrigerant coolant from the condenser;

at least one evaporator unit disposed within the housing receiving refrigerant coolant from the expansion valve;

means for returning warmed refrigerant coolant from the at least one evaporator unit to the compressor motor;

impeller means connected to the housing for drawing air from the aircraft galley into the housing of the cooling system through said at least one vent to circulate the air from the aircraft galley over the at least one evaporator to cool the air; and

discharge means for receiving cooled air from the impeller means and discharging the cooled air into the aircraft galley.

22. The cooling system of Claim 21, wherein the discharge means comprises a volute for receiving air from the impeller.

23. The cooling system of Claim 22, further comprising a discharge funnel connected to the volute for discharging cold air from the volute, the discharge funnel extending outside of the enclosure of the housing.

24. The cooling system of Claim 23, wherein the discharge funnel comprises a plurality of cooling air discharge ports.

25. The cooling system of Claim 21, further comprising a sight glass connected to a refrigerant coolant duct connected to the condenser for viewing the condition of the refrigerant coolant exiting the condenser.

26. The cooling system of Claim 21, further comprising a filter and dryer unit connected to receive refrigerant coolant for filtering and removing water from the refrigerant coolant.

27. The cooling system of Claim 21, wherein the expansion valve receives refrigerant coolant from the filter and dryer unit.

28. The cooling system of Claim 21, wherein the housing comprises a compressor motor access opening, and a compressor motor maintenance cover mounted to the housing over the compressor motor access opening to provide access to the compressor motor.

29. The cooling system of Claim 25, wherein the housing comprises a sight glass access opening, and a sight glass cover mounted to the housing over the sight glass access opening to provide access for viewing the sight glass.

30. The cooling system of Claim 26, wherein the housing comprises a filter/dryer access opening, and a filter/dryer maintenance cover mounted to the housing over the filter/dryer access opening to provide access to the filter and dryer unit.

31. The cooling system of Claim 21, wherein the at least one vent comprises left and right side vents.

32. The cooling system of Claim 21, wherein the condenser comprises an inlet and an outlet for the refrigerant coolant, a central duct connected between the inlet and the outlet, an

outer cooling jacket portion disposed over at least a portion of said central duct for cooling compressed refrigerant coolant which is conducted through the central duct of the condenser.

33. The cooling system of Claim 32, wherein the outer cooling jacket is connected to a liquid entry duct which receives a flow of a cooling liquid.

34. The cooling system of Claim 21, wherein the cooled refrigerant coolant is condensed to a liquid phase in the condenser.

35. The cooling system of Claim 21, wherein the at least one evaporator unit comprises first and second evaporator units.

36. The cooling system of Claim 35, wherein the first and second evaporator units are connected in series.

37. The cooling system of Claim 21, wherein the impeller means comprises an impeller and an impeller motor to drive the impeller.

38. The cooling system of Claim 21, further comprising an electrical power supply connected to supply electrical power to the compressor motor and to the impeller means.

39. The cooling system of Claim 38, wherein the electrical power supply has an input connector for receiving electrical power and electrical control signals for controlling the operation of the cooling system.

40. The cooling system of Claim 21, further comprising a drain pan disposed within the housing for collection of condensation from the housing of the cooling system.

41. The cooling system of Claim 40, wherein the drain pan further comprises a condensation drain for drainage from the drain pan.

42. A cooling system for use on aircraft, comprising:
at least one galley cooling unit having a galley plenum and an evaporator within the galley plenum for conveying heat from the galley plenum to an intermediate working fluid;
at least one liquid condensing chiller subsystem remotely located with respect to said at least one galley cooling unit;

said at least one liquid condensing chiller subsystem including at least one recirculation unit receiving the intermediate working fluid from said evaporator to cool the intermediate working fluid;

said at least one recirculation unit including a compressor connected in fluid communication with said evaporator for receiving the intermediate working fluid from said evaporator for compressing the intermediate working fluid;

said at least one recirculation unit including a liquid cooled condenser connected in fluid communication with said compressor for receiving compressed intermediate working fluid from said compressor for cooling said intermediate working fluid, said liquid cooled condenser connected in fluid communication with said evaporator for returning said intermediate working fluid to said evaporator; and

said at least one liquid condensing chiller subsystem including at least one heat expelling heat exchanger connected in fluid communication with said liquid cooled condenser for receiving a chiller liquid from said liquid cooled condenser for cooling said chiller liquid and recirculating said chiller liquid to said liquid cooled condenser.

43. The cooling system of Claim 42, wherein said intermediate working fluid is water.

44. The cooling system of Claim 42, wherein said galley plenum includes ducts in communication with said evaporator to direct a flow of air in thermal communication with said evaporator through the galley plenum for cooling said galley plenum.

45. The cooling system of Claim 44, wherein said galley plenum further comprises a galley blower for directing the flow of air through the galley plenum for cooling said galley plenum.

46. The cooling system of Claim 45, wherein said galley plenum further comprises at least one galley food cart.

47. The cooling system of Claim 42, wherein said liquid cooled condenser is connected in fluid communication with said compressor by a non-insulated fluid bus.

48. The cooling system of Claim 42, further comprising a heat exchanger receiving cooled intermediate working fluid from said liquid cooled condenser and connected between said

evaporator and said compressor for cooling said intermediate working fluid communicated from said evaporator to said compressor.

49. The cooling system of Claim 42, further comprising a liquid control valve connected between said liquid cooled condenser and said evaporator for controlling flow of the intermediate working fluid to the evaporator.

50. The cooling system of Claim 42, further comprising a filter connected between said liquid cooled condenser and said evaporator.

51. The cooling system of Claim 42, further comprising an expansion valve connected between said liquid cooled condenser and said evaporator.

52. The cooling system of Claim 42, further comprising a solenoid valve connected between said liquid cooled condenser and said evaporator.

53. The cooling system of Claim 42, wherein said at least one liquid condensing chiller subsystem comprises a plurality of liquid condensing chiller subsystems remotely located with respect to said at least one galley cooling unit, wherein said intermediate working fluid is in thermal communication with each of said plurality of condensing chiller subsystems.

54. The cooling system of Claim 42, wherein said at least one liquid condensing chiller subsystem comprises a chiller liquid pump connected in fluid communication between said liquid cooled condenser and said at least one heat expelling heat exchanger for recirculating said chiller liquid from said heat expelling heat exchanger to said liquid cooled condenser.

55. The cooling system of Claim 42, wherein said chiller liquid is water.

56. The cooling system of Claim 42, wherein said chiller liquid is a mixture of water and glycol.

57. The cooling system of Claim 54, wherein said at least one liquid condensing chiller subsystem includes a controller unit operatively connected to said chiller liquid pump for controlling the operation of said chiller liquid pump.

58. The cooling system of Claim 57, further comprising at least one temperature sensor connected to said controller unit and associated with said heat expelling heat exchanger for sensing the temperature of said heat expelling heat exchanger.

59. The cooling system of Claim 57, further comprising at least one temperature sensor connected to said controller unit and associated with said intermediate fluid downstream from said evaporator for sensing the temperature of said intermediate fluid downstream from said evaporator.

60. The cooling system of Claim 42, further comprising a fan associated for drawing ambient air across said at least one heat expelling heat exchanger for cooling said at least one heat expelling heat exchanger.